

We claim:

1        1.        In a multi-protocol label switching system (MPLS) data network comprised of  
2                a plurality of data switches that are interconnected to form a plurality of data  
3                paths from a source node to a destination node through a first set of data  
4                switches, a method of establishing a protection path from said source switch to  
5                said destination switch through a second set of switches, said method  
6                comprised of the steps of:

7                a.        sending a first predetermined control message, over a first data path from  
8                said first switch to a second switch, said first predetermined message  
9                establishing at least a working path through said network between said  
10               first and second switches.

11               b.        sending a second predetermined control message, over a second data path  
12               from said first switch to a second switch, said second predetermined  
13               message establishing at least a protection path through said network  
14               between said first and second switches.

15               c.        Associating said first working path to said protection path to enable  
16               protection switching.

1        2.        The method of claim 1 wherein said step of sending at least a first  
2                predetermined message is comprised of the step of adding a protection  
3                messaging field to a label distribution protocol (LDP) message, said protection  
4                messaging field carrying protection pathway information between MPLS  
5                network switch elements.

1        3.        The method of claim 1 wherein said step of sending at least a first  
2                predetermined message is comprised of the step of adding a protection  
3                messaging field in an MPLS reservation protocol message (RSVP), said  
4                protection field carrying protection pathway information between MPLS  
5                network switch elements.

1        4.        The method of claim 1 wherein said step of sending at least a first  
2                predetermined message, over a first data path from said first switch to a  
3                second switch, said first predetermined message establishing at least a  
4                working path through said network between said first and second switches  
5                includes the step of:  
6                a.    identifying at least one data switch of said MPLS network as a switch  
7                element by the contents of at least one control field in a message field of  
8                an MPLS message;  
9                b.    sending said at least one control field to at least one data switch of said  
10              MPLS network.

1        5.        The method of claim 1 wherein said step of sending at least a first  
2                predetermined message, over a first data path from said first switch to a  
3                second switch, said first predetermined message establishing at least a  
4                protection path through said network between said first and second switches  
5                includes the step of:

- 6 a. identifying at least one data switch of said MPLS network as a protection  
7 switch element by the contents of at least one control field in a message  
8 field of an MPLS message;  
9 b. sending said at least one control field to at least one data switch of said  
10 MPLS network.

1 6. The method of claim 1 wherein said step of label binding said first  
2 predetermined message from said second switch to a third switch.

1 7. The method of claim 1 wherein said first data path is set up loosely.

1 8. The method of claim 1 wherein said first data path is set up explicitly.

1 9. The method of claim 1 further including the step of mapping labels to data  
2 routed along said first data path according to predetermined criteria that  
3 includes the quality of service to be granted said data.

1 10. In a multi-protocol label switching system (MPLS) data network comprised of  
2 a plurality of data switches that are interconnected to form a plurality of data  
3 paths from a source node to a destination node through a first set of data  
4 switches, a method of establishing a working path from said source switch to  
5 said destination switch through said first set of switches, said method  
6 comprised of the steps of:

a. sending at least a first predetermined control message, over a first control path from said first switch to a second switch, said first predetermined control message establishing at least a working path through said network between said first and second switches over which data is to be sent from said source switch to said destination switch.

11. The method of claim 10 wherein said step of sending at least a first predetermined control message is comprised of the step of adding a protection messaging field to a label distribution protocol (LDP) message, said protection messaging field carrying protection pathway information between MPLS network switch elements.

12. The method of claim 10 wherein said step of sending at least a first predetermined control message is comprised of the step of adding a protection messaging field in an MPLS reservation protocol message (RSVP), said protection field carrying protection pathway information between MPLS network switch elements.

13. The method of claim 10 wherein said step of sending at least a first predetermined control message, over a first data path from said first switch to a second switch, said first predetermined control message establishing at least a protection path through said network between said first and second switches includes the step of:

- 6 a. identifying at least one data switch of said MPLS network as a protection  
7 switch element by the contents of at least one data field in a message field  
8 of an MPLS message;  
9 b. sending said at least one data field to at least one data switch of said  
10 MPLS network.

1 14. The method of claim 10 wherein said first data path is set up loosely.

1 15. The method of claim 10 wherein said first data path is set up explicitly.

1 16. The method of claim 10 further including the step of mapping labels to data  
2 routed along said first control path according to predetermined criteria that  
3 includes the quality of service to be granted said data.